



CS8.0 UPRIGHT AND RECUMBENT BIKE OWNER'S GUIDE



THANK YOU FOR SELECTING TRUE

In 1981, Frank Trulaske launched TRUE Fitness®, and began manufacturing premium hand-crafted treadmills.

His team's obsession with quality has propelled TRUE to the top of the fitness industry and has created one of America's oldest, largest and most respected fitness equipment manufacturers.

Over the years, TRUE has designed, developed, patented and fabricated many new cutting-edge innovations for their products. Such advancements include ground-breaking new features, state-of-the-art manufacturing components, and technological breakthroughs.

While TRUE has expanded its line of products, intensive quality control standards guarantee excellence in every phase of production. This results in the finest products available in the marketplace.



"OUR ORIGINAL GOAL WAS TO BUILD THE WORLD'S BEST FITNESS EQUIPMENT, AND TODAY WE BELIEVE WE'RE DOING IT!"

-FRANK TRULASKE

TRUE is the choice for cardio workouts among beginners, rehab patients and top athletes worldwide.

Today TRUE Fitness offers a full line of premium elliptical trainers, treadmills, upright and recumbent bikes, and flexibility equipment.



REVIEW FOR YOUR SAFETY

IMPORTANT SAFETY INSTRUCTIONS

When using this exercise machine, basic precautions should always be followed, which includes the following:

Read and understand all instructions and warnings prior to use.

Obtain a medical exam before beginning any exercise program. If at any time during exercise you feel faint, dizzy, or experience pain, stop and consult your physician.

Obtain proper instruction prior to use.

Inspect the bike for incorrect, worn, or loose components and do not use until corrected, replaced, or tightened prior to use.

Do not wear loose or dangling clothing while using the bike.

Care should be used when mounting or dismounting the bike.

Read, understand, and test the emergency stop procedures before use.

Disconnect all power before servicing the bike.

Do not exceed maximum user weight of 300 lbs.

Keep children and animals away.

All exercise equipment is potentially hazardous. If attention is not paid to the conditions of equipment usage, death or serious injury could occur.



QUICK START

Begin pedaling. The display will start up in WORKOUT SETUP.

STARTING UP

QUICK START into a manual workout by pressing  .

SELECT A DIFFERENT WORKOUT by pressing the workout keys. Press workout keys more than once for more workouts.

ACCEPT EACH SETTING AND MOVE TO THE NEXT ONE by pressing  . Enter your personal data — weight, age, and sex — for best results.

BEGIN YOUR WORKOUT by pressing  at any time.

ADJUST YOUR EXERCISE WORKLOAD by using the  or  keys or the numeric keys.

DURING
YOUR
WORKOUT

VIEW DIFFERENT DISPLAY DATA by pressing the Change Display key  to alternate between two different sets of data.

CHANGE WORKOUTS on-the-fly by pressing other workout keys.

The bike will retain your workout data for about 15 seconds after you stop pedaling.

PAUSING
YOUR
WORKOUT

Specifications/Features/Software are subject to change



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CHAPTER ONE

INTRODUCTION

IN THIS CHAPTER:

TOP FEATURES

FANCY FEATURES

BASIC FEATURES

Chapter 1: Introduction

- Chapter 2: Riding Your Bike
- Chapter 3: The Display
- Chapter 4: Workout Setup
- Chapter 5: Manual Control
- Chapter 6: Pre-Set Workouts
- Chapter 7: Heart Rate Control
- Chapter 8: Calorie Goal Workout

Chapter 9: Designing Your Own Workout

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- Chapter 12: Other Functions
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TOP FEATURES

CHAPTER ONE: INTRODUCTION

Your new CS8.0 bike console is the most sophisticated exercise computer in the fitness industry. Even the simplest operation, Manual Control, works in a special and useful way. But the CS8.0 console is also extremely easy to use; the user can ignore all the fancy stuff and use it with just one or two keystrokes.

INTRODUCTION

TOP FEATURES

Smart Start: Intelligently picks useful workout settings — every workout, even an advanced one, is easy to set up.

Always-available Workout Setup: Switch to this at any time in any workout. Adjust your current workout settings, or set up a whole new workout.

Calorie Goal: Tell the bike how many calories you want to burn and how long you want to work out, and the bike figures out what workloads you need to maintain — including warmup and cool down.

Constant Heart Rate Control: The bike takes you to your target heart rate within five to eight minutes, then keeps you there.

Interval Heart Rate Control: Pick both a work target HR and a rest target HR, and the bike will take you back and forth between those two targets.

Fitness Test: An enhanced version of the YMCA protocol to estimate maximum oxygen uptake (VO2max).

Bicycle Simulation: An accurate simulation of a 21-gear road bike, including precise pedal cadence-to-speed response and body weight compensation.



FANCY FEATURES

CHAPTER ONE: INTRODUCTION

Advanced Custom Programming: Create up to three different program profiles, up to 60 segments long, using any of four different programming methods, including a Record mode.

Custom Intervals: Choose your own interval workload and duration.

HRC Ultra: Both continuous and interval heart rate control workouts, with gradually increasing target heart rates that replicate real-world maximum-intensity workouts.

Improved Maximum Heart Rate Estimates: Instead of the “220 - age” formula, the CS8.0 console uses a newer, more accurate formula created by exercise physiologists in 1994.

Medical and Ergometer Modes: Feature-restricted modes suitable for rehabilitation and informal testing environments, with user-selectable pedal rpm limiting.

Happy Workout: If riders want to think they’re burning lots of calories when they are actually hardly working at all, this workout is for them.

FANCY FEATURES



BASIC FEATURES

CHAPTER ONE: INTRODUCTION

Three-mode Manual Control: MET-based, bicycle simulation, or 10-watt increments.

Four Pre-set Programs: Easy intervals, speed intervals, rolling hills, and one big hill.

CSAFE Audio Control: Volume and channel remote control of compatible systems.

CSAFE Power: Supply power to an external audio remote control.

Fully Configurable Setup Mode: Choose default operational mode, metric or U.S. units of measure, maximum workout time, default workout time, pause time, wireless or contact heart rate priority, sound on or off, and default manual workload control.

Multiple Odometers: Miles, hours, total starts, and program selection counters.

Test Mode: Monitor raw rpm, target vs. actual workload, LCD performance, and keypad function.



CHAPTER TWO

RIDING YOUR BIKE

IN THIS CHAPTER:

WORKOUT BASICS

RIDING FORM

HEART RATE MONITORING

CHEST STRAP USE

CONTACT HEART RATE USE

GETTING THE MOST FROM CHR

Chapter 1: Introduction
Chapter 2: Riding Your Bike
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Set your weight before every workout. This allows the CS8.0 bike to control your workout more effectively. See the Personal Power section in Chapter 5 for more information.

The body weight setting does not affect the calorie expenditure calculation. Unlike treadmills or other weight-bearing exercises, calories burned during exercise biking does not change with different body weights. (See ACSM's *Guidelines*, Bibliography.)

Variations in human exercise efficiency are another potential source of error, with differences of plus or minus 10% common in the population.

SETTING YOUR WEIGHT



Adjust the seat so that your knee is slightly bent when your leg is fully extended with your feet on the pedals.



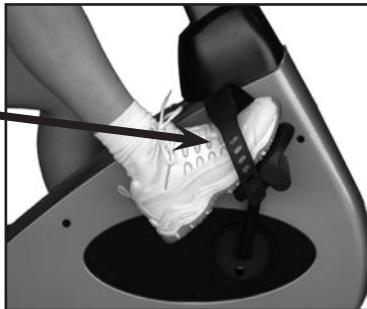
SEAT ADJUSTMENT

While standing next to the bike, pull out the seat adjust knob and lower the seat to the lowest position. Next, get onto the bike with one leg fully extended in a pedal, supporting most of your weight. Grasp the horn of the seat and pull it up under you to a snug fit, letting the ratcheting mechanism lock the knob and pin in place.

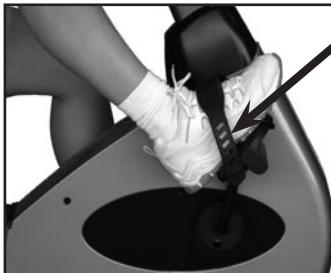


UPRIGHT BIKE SEAT ADJUSTMENT PROCEDURE

Riders are most efficient if they place the ball of their foot in the center of the pedal.



FOOT POSITION



Other riders are more comfortable if the arch of their foot is against the pedal. Riders are encouraged to be as efficient as possible, but use your own judgement in the comfort/efficiency tradeoff.

Most riders will find a comfort/efficiency sweet spot at a pedal cadence around 80 rpm. More serious riders desiring maximum performance typically pedal at around 100 rpm. For electromechanical and safety reasons, the bike will not provide the fully requested workload when your pedal cadence falls below 55 rpm. It will, however, accurately display the workload it does provide. For additional safety, cadence is workload limited.

PEDAL CADENCE

Breathe in a regular and relaxed manner. Many exercisers do not breathe enough, which reduces their exercise capacity and comfort. You might want to try breathing deeper and more frequently to see if it helps your exercise regime.

BREATHING

The CS8.0 bike has two ways of monitoring your heart rate:

1. By using a chest strap that transmits your heart rate to the bike via radio.



**MONITORING
YOUR HEART
RATE**

2. By using the metal contact heart rate pads on the handlebars.



Upright Upper HRC
Pads



Upright Lower HRC
Pads



Recumbent HRC
Pads

Although your bike functions fine without using the heart rate monitoring feature, this kind of monitoring gives you valuable feedback on your effort level. Chest strap monitoring also allows you to use Heart Rate Control, which is the most advanced exercise control system available.

When you wear a Polar or compatible transmitter strap, the bike will display your heart rate as a digital beats-per-minute (bpm) readout. This monitoring is very accurate, typically within one beat per minute.

The transmitter strap should be worn directly against your skin, about one inch below the pectoral muscles/breast line (see picture below). Women should be careful to place the transmitter below their bra line.



CHEST STRAP HEART RATE MONITORING

Examples of Heart Rates Found in Daily Life

An average 30-year-old might have a resting heart rate, when sitting totally still for several minutes, of **65**. During hard exercise that can be sustained for 10 to 15 minutes it might be around **140** continuously. A maximum heart rate that requires maximal exercise for several minutes to attain is **185**.

A 30-year-old in good shape might have a resting heart rate near **55**, and might exercise for 20 minutes at a heart rate of **160**.

A world-class distance runner or professional cyclist might have a resting heart rate near **45**.

Some moisture is necessary between the strap and your skin. Sweat from your exercise works best, but ordinary tap water may be used prior to your workout if desired.

The contact heart rate system lets you monitor your heart rate without wearing a strap.

CONTACT HEART RATE (CHR)

A Note on CHR Accuracy

CHR monitoring may be a bit less accurate than a chest strap, since the heart rate signals are much stronger at the chest.

The CS 8.0 bike uses the most advanced CHR system available. It converts your heart rate waveform to a digital signal, then analyzes the digitized waveform to pick out the electrocardiogram shape and thus the heart rate.

About 5% of the population cannot be picked up by any CHR system. This is because their heart is positioned in a more up-and-down manner in their chest, as opposed to leaning over to one side.

Gently grasp the contact heart rate pads as shown below.



When the system detects your hands, the heart rate LED will flash in time with your heart beat. During this time, the system is analyzing and locking in your heart rate. Within about 10 seconds, your digital heart rate in beats per minute (bpm) should be displayed.

1. Exercise with smooth body motions. Avoid excessive body motion, especially in your arms and upper body.
2. Breathe smoothly and regularly, and avoid talking. (Talking will cause unrepresentative heart rate spikes of 5 to 10 bpm.)
3. Grip the pads lightly, not tightly.
4. Make sure your hands are clean, free of both dirt and hand lotions.

FOR BEST
RESULTS

When using a Heart Rate Control (HRC) workout or the Fitness Test, it is best to use chest strap monitoring. These workouts work best with the extra accuracy gained from a chest-contact heart rate monitoring system.

A wall transformer external power option is available which gives the CS8.0 bike some additional capabilities:

EXTERNAL
POWER
OPTION

- The bike's display is always lit in Attract Mode (see Chapter 13). This can make the bike more friendly and interesting to prospective riders.
- Test Mode diagnostics are more versatile (see Chapter 15).
- The bike's minimum workload is lower, which is required by the Medical and Ergometer modes (see Chapter 11) and recommended for the Fitness Test (see Chapter 10).



CHAPTER THREE

THE DISPLAY

IN THIS CHAPTER:

KEYPAD LAYOUT
WHAT THE KEYS DO
UPPER CONSOLE
HOW TO READ YOUR DISPLAY

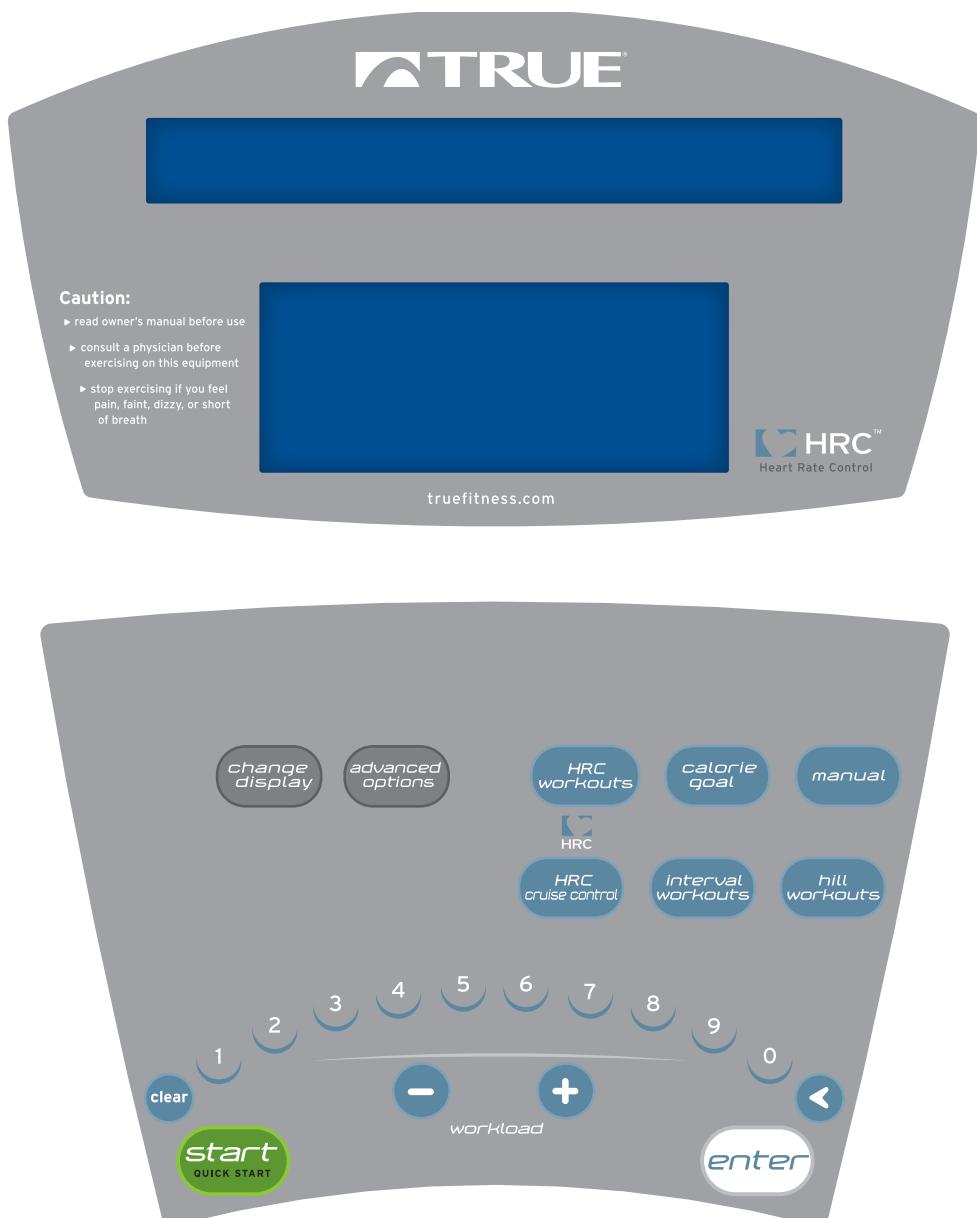
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KEYPAD LAYOUT

CHAPTER THREE: THE DISPLAY



THE KEYS

 **Change Display:** Changes data readouts from one set of four to the other set. Press and hold for two seconds to have the sets automatically alternate back and forth every five seconds.

 **Workload:** Adjusts workload higher and lower. Keys repeat if held down.

 **0** through **9** **Numeric Keys:** Used for data entry in Workout Setup. During a workout, used to change workload by entering a numeric value and pressing .

 **Backspace:** Deletes your last data keystroke, just like your computer keyboard's backspace key.

 **Clear:** Zeros-out current data entry. Press and hold to completely clear and reset display.

 HRC Workouts

HRC Workouts: Cycles through Constant, Interval, HRC Ultra, and HRC Ultra Interval. See Chapter 7.

 calorie goal

Calorie Goal: Selects the Calorie Goal workout. See Chapter 8.

 interval workouts

Intervals: Cycles through Easy, Sport, and Custom. See Chapter 6.

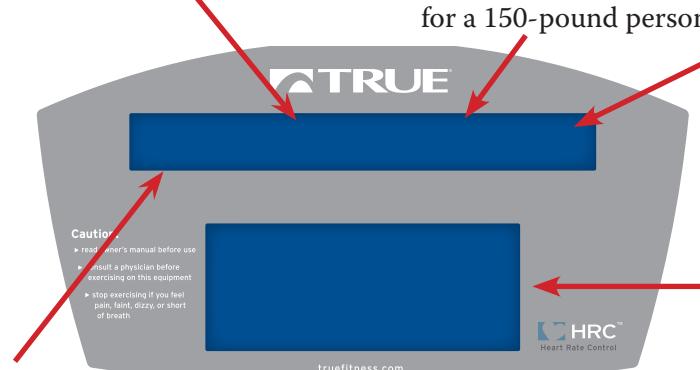
 hill workouts

Hill Workouts: Cycles through Rolling and One Big Hill. See Chapter 6.

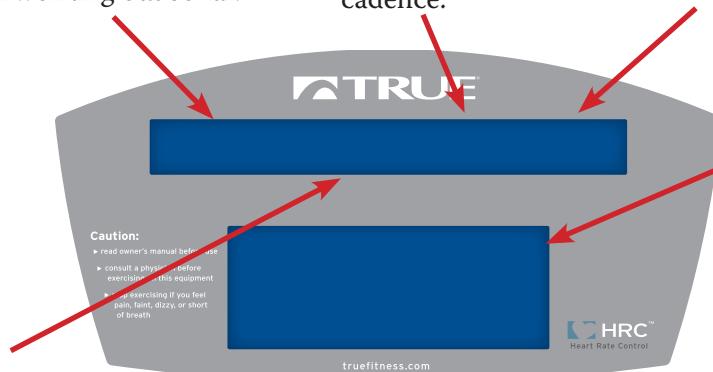
 advanced options

Advanced Options: Cycles through Custom Workouts, and Fitness Test. Medical, Ergometer, and Happy modes are accessed through Setup Mode only. See Chapters 9 and 10.

Distance: An estimate of how far you would have traveled on an outdoor bike.*



Time: The amount of time remaining in your workout. If you press **clear**, this becomes elapsed time; how long you have been working out so far.*



METs: Your METs rate.*

*Pressing the "Change Display" key switches the readout from one set of values to the other set of values. If you press and hold the "Change Display" key for one second, the display will enter "Scan Mode" and switch between the two sets of values.

Calories: An estimate of your calories burned. This does not include your basal metabolic rate, which is about 72 calories per hour for a 150-pound person.*

Heart Rate: In beats per minutes (bpm).*

Progress Display: Shows your progress and workload profile through your workout.

RPM: Your pedal cadence.*

Heart Rate: In beats per minutes (bpm).*

Progress Display: Shows your progress and workload profile through your workout.

Level: In all other workout modes, indicates which workout level is selected. In Bike Mode, indicates which of 21 gears is selected.

Time: Shows the amount of time remaining in your workout. If you press  *clear*, this becomes elapsed time: how long you've been working out so far.

Miles: Shows an estimate of how far you would have traveled on an outdoor road bike.

Calories: Displays an estimate of your calories burned. This doesn't include your basal metabolic rate, which is about 72 calories per hour for a 150-pound person.

RPM: Shows your pedal cadence.

Watts: The amount of mechanical power the bike is receiving from your exercise. This is not the same as the amount of power your body is using, since the average person is only about 20% efficient at generating mechanical power.

Heart Rate: In beats per minute (bpm).

METs: Your METs rate. See *Appendix B*.



CHAPTER FOUR

WORKOUT SETUP

IN THIS CHAPTER:

SETTING UP YOUR WORKOUT
DURING YOUR WORKOUT

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Workout Setup is available both before and during your workout. In Workout Setup:

- You can easily edit all the available options of each workout.
- You see a Workout Preview graphic with a representation of how your workout progress will look.
- Smart Start makes intelligent suggestions for settings that are useful to most riders, and changes its suggestions to adapt to your own settings.
- Helpful tips are displayed if you get stuck.

Use either the ,  or numeric keys to change settings.

Press  to accept the current parameter and move to the next one. Press  when you're done and ready to begin your workout.

The  key deletes your last data keystroke. The  key completely clears out the current entry. If you hold the  key down for one second, the default Smart Start settings will be restored.

Compose your workout at your leisure. Your workout begins only when you press .



CHAPTER FIVE

MANUAL CONTROL

IN THIS CHAPTER:

PERSONAL POWER FINE CONTROL
BIKE MODE

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Manual Control can operate three different ways: Personal Power Fine Control, Bike Mode, and 10-watt mode.

In all modes, change levels either by using the ,  keys, or entering a workload level with the numeric keys and pressing .

This default manual control has 77 different levels (for a 150-pound rider), allowing you to fine-tune your workout. Since Personal Power is used, the number of levels available decreases for larger riders. This mode uses constant power workload control (see *Appendix C*).

The second mode is Bike Mode, which simulates a 21-speed road bike, compensating for body weight with Personal Power, simulating air resistance, and computing speed correctly for the selected gear and cadence. The 21 “gears” are like that of a bike that has gearing from 50 to 105 inches.

Bike Mode uses constant torque (see *Appendix C*), then adds additional workload for the simulations and compensations. The calculations are adapted from the power formulas in *Bicycling Science*, the leading reference in this field (see *Bibliography*).

The final mode is a conventional 10-watt increment constant power mode.

INTRODUCTION

PERSONAL POWER FINE CONTROL

BIKE MODE

10-WATT MODE



CHAPTER SIX

PRE-SET WORKOUTS

IN THIS CHAPTER:

WORKOUT CHOICES

HILL WORKOUT PROFILES

INTERVAL WORKOUT PROFILES

HOW WORKOUT AND SEGMENT LEVELS AFFECT METS

HOW YOUR WEIGHT AFFECTS WORKLOAD

CUSTOM INTERVALS

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Just like manual control, the hill and interval workouts compensate for different body weights.

The two hill workouts are:

- **Rolling Hills**, a series of gently changing workloads.
- **One Big Hill**, with the workload gradually increasing to a maximum at the halfway point, then decreasing gradually to the end.

The two interval workouts are:

- **Easy intervals**, with a moderate change between work and rest intervals.
- **Sport intervals**, with a large change between work and rest intervals.

Each workout segment can have a value between 1 and 8. The overall workout can be adjusted to 16 possible levels. The workload level of a workout segment is calculated by the formula.

*$METs = (scaler1 * segment) * (scaler2 * level) + 2$*

METs are then converted to T-Mets.

Scalor1 and scalor2 are mathematical formulas which subtly change the scale and magnitude of both the segment and level variables.

The constant “2” is simply the minimum METs level controllable by the bike.

HILL AND INTERVAL WORKOUTS



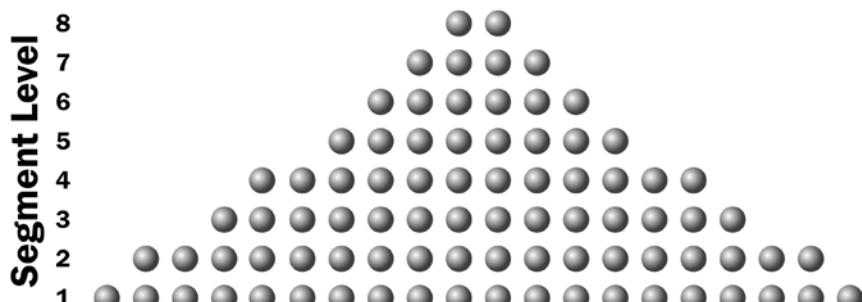
HILL WORKOUT PROFILES

CHAPTER SIX: PRE-SET WORKOUTS



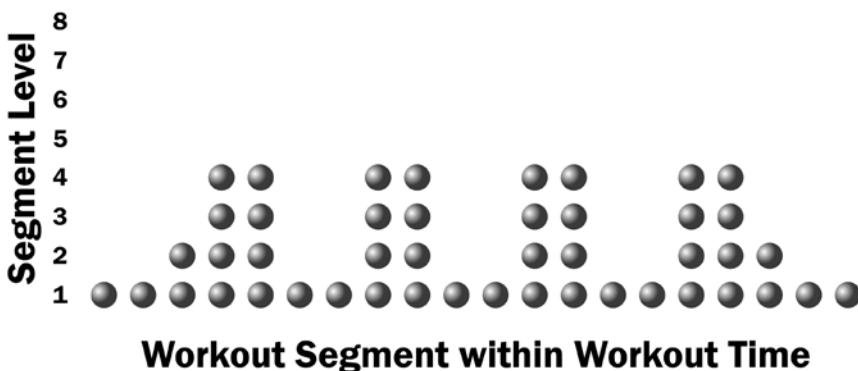
Workout Segment within Workout Time

ROLLING HILLS

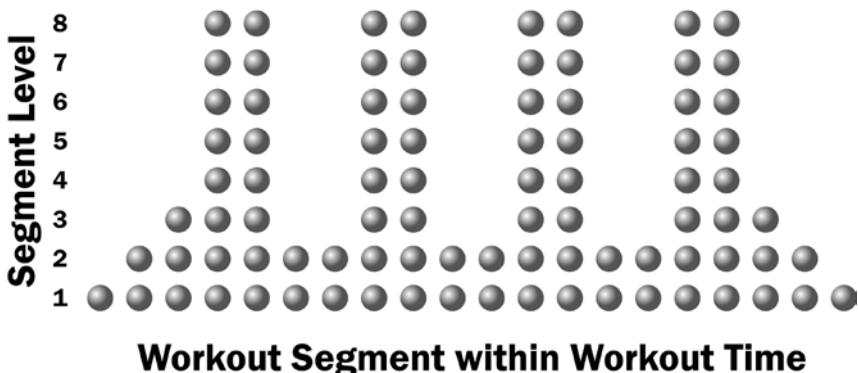


Workout Segment within Workout Time

ONE BIG HILL

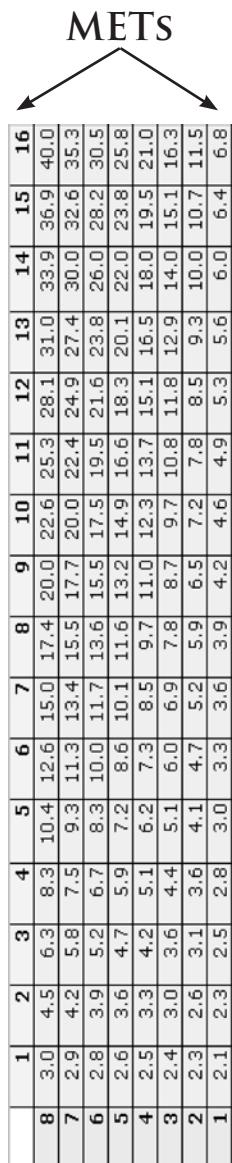
INTERVAL
WORKOUT
PROFILES

EASY INTERVALS



SPORT INTERVALS

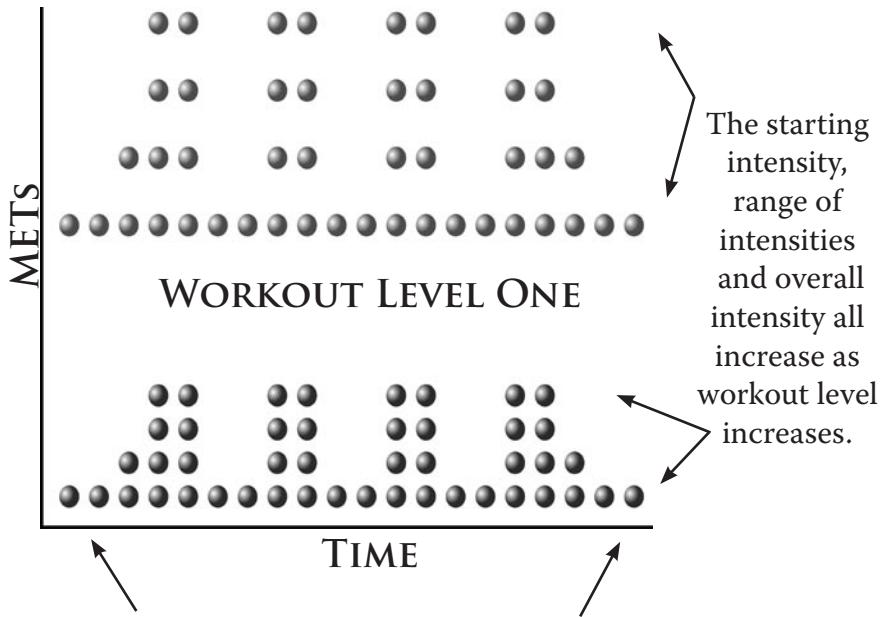
PROGRAM LEVEL



SIXTEEN DIFFERENT LEVELS ARE AVAILABLE TO CHANGE THE DIFFICULTY OF A WORKOUT. THE WORKLOAD INTENSITIES EXPAND AND CONTRACT DEPENDING ON THE LEVEL.

HOW
WORKOUT
AND SEGMENT
LEVELS AFFECT
METS

WORKOUT LEVEL FOUR



(This graph is a figurative representation.
Actual workouts differ in composition.)

Since interval training is a common type of workout, the CS8.0 console has an extra-easy way to create a custom interval workout. After selecting Custom Intervals, pick the work segment and rest segment durations, then pick the work and rest segment exercise levels.

When you use the workout, the segments repeat over and over until you reach the end of your workout time. Or, you can have the workout last for a certain number of work intervals.

HOW
WORKOUT
LEVELS AFFECT
RANGE OF
WORKLOAD

CUSTOM
INTERVALS
(ALSO DESCRIBED
IN CHAPTER 9)

HEART RATE CONTROL

IN THIS CHAPTER:

INTRODUCTION TO HRC

TYPES OF HRC

CONSTANT AND INTERVAL HRC

INTRO TO HRC ULTRA

HRC ULTRA WORKOUT

INTERVAL HRC ULTRA WORKOUT

CRUISE CONTROL

IMPORTANT POINTS ABOUT HRC

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TRUE's heart rate control (HRC) workouts let the bike monitor your relative exercise intensity by way of your heart rate, then automatically adjust the workload to keep you at your target heart rate and thus your desired exercise intensity.

CONSTANT HRC

Your heart rate is a good measure of your body's exercise stress level. It reflects differences in your physical condition, how tired you are, the comfort of the workout environment, even your diet and emotional state. Using heart rate to control workload takes the guesswork out of your workout settings.

Consult your physician before using heart rate controlled workouts for advice on selecting a target heart rate range. Also, it is important to use the bike for several workouts in the manual mode while monitoring your heart rate. Compare your heart rate with how you feel to ensure your safety and comfort.

See *Appendix A* for a chart that may help you pick a target heart rate.

You need to wear a heart rate monitoring chest strap to use heart rate control. See the "Monitoring Your Heart Rate" section in *Chapter 2* for a guide to proper usage. It is not recommended that you use the contact heart rate system for heart rate control workouts.



The CS8.0 bike has five types of heart rate control:

TYPES OF HRC

- **Constant:** pick a target heart rate, and the bike will control your workout from the very beginning so that you reach your target within five to seven minutes.
- **Interval:** pick both a work target and a rest target heart rate. The bike will take you back and forth between these two targets.
- **HRC Ultra:** simulates a real high-intensity workout by automatically raising your target heart rate as you proceed through the last half of your workout.
- **HRC Ultra Interval:** simulates a real interval workout, with progressively higher targets for each work and rest interval.
- **Cruise Control:** while in any program, set your current heart rate as your target by pressing a single key.

Constant HRC is the most well known type of HRC, and is the easiest to use. The bike will gradually raise your heart rate so that you reach your target within five to seven minutes. It keeps you there until 2.5 minutes before the end of your workout time, then reduces workload by half for a cooldown.

CONSTANT HRC

Note that as you tire during your workout, especially in the last third, workload will usually have to be reduced to keep you at a steady target heart rate.

To change your target heart rate, press the ,  keys to change one bpm at a time, or enter a new target with the numeric keys and press .

This allows you to do a classic interval workout with the bike controlling all workloads, including the rest segments. After reaching your work target just like in Constant HRC, the workload is immediately reduced by 65%, then controlled so you reach your rest target within about three minutes.

INTERVAL HRC

As soon as you reach your rest target, the workload is immediately increased to the last workload attained in the work segment, then controlled to reach your target within about two minutes.

This pattern repeats until 2.5 minutes before the end of your workout time, then reduces workload to the last rest segment workload.

To change your work or rest targets, press the ,  keys to change one bpm at a time, or enter a new target with the numeric keys and press .

As mentioned in the Constant HRC section, as you tire in the last third of your workout, your heart rate has a tendency to rise, which Constant HRC addresses by reducing workload.

However, exercisers who are really serious and in very good condition always let their heart rates rise during the last third of their workouts, usually to very high levels. The HRC Ultra workouts are designed to simulate this kind of high-intensity workout.



WHY USE HRC ULTRA WORKOUTS?

Do not attempt these workouts unless you are certain you are in good medical and physical condition. Failure to observe this warning may result in shortness of breath, dizziness, or death

Unlike Constant and Interval HRC, you don't pick a target heart rate, but you must enter your age correctly.

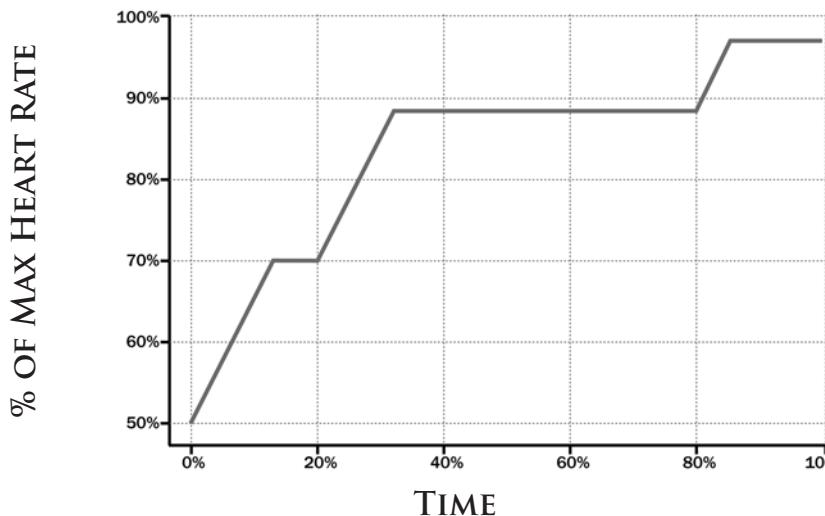
HRC ULTRA WORKOUT

For the first fifth of your workout time, HRC Ultra tries to increase your heart rate to 70% of your maximum heart rate (HRmax) within three to four minutes.

In the middle three-fifths of your workout, HRC Ultra increases your heart rate to 88% HRmax within three to four minutes, and then maintains that heart rate.

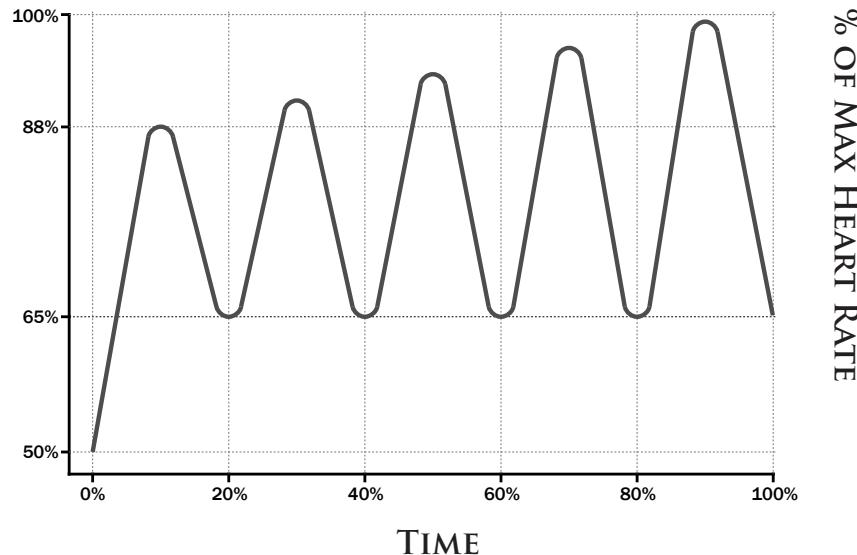
During the final fifth of your workout, HRC Ultra tries to raise your heart rate to 97% HRmax by the time you reach one minute to go in your workout time.

Note: if you prefer lower ("less Ultra") heart rate targets in either Ultra workout, you can reduce the targets across the board by pressing the **-** key.



Interval HRC Ultra works similarly to Interval HRC, but the work target heart rates gradually increase through your workout. The first work segment target is 88% HRmax, and the last work segment target is 97% HRmax.

The rest segment target is 65%. Note that workload usually has to be greatly decreased to allow you to reach this low a heart rate within a desirable time.

INTERVAL
HRC ULTRA



CRUISE CONTROL

CHAPTER SEVEN: HEART RATE CONTROL

This is the simplest way to enter Constant HRC training. While in manual or any program you can enter Constant HRC by simply pressing the Heart Rate Control key. Your current heart rate will be set as the target.

CRUISE CONTROL

For best results, you should be at least five minutes into your workout and warmed up. This will allow Cruise Control to more accurately control your heart rate.

Remember, you must be wearing a chest strap, and your heart rate should be displayed in the Heart Rate window.

To change your target heart rate, press the , keys to change one bpm at a time, or enter a new target with the numeric keys and press .

The heart rate monitor transmitter strap should be worn according to the guidelines in *Chapter 2*.

If the transmitter strap is adjusted or moved while exercising, heart rate monitoring may be temporarily affected.

If communication is lost for 30 seconds, the bike will exit the HRC workout into a manual workout.

The transmitter strap sends a low-level radio signal to the bike, so interference from other radio and sound waves (including everything from cordless telephones to loudspeakers) is possible. The good news is that interference is usually quite brief. If you continue to have intermittent heart rate display problems, consult your local service technician, as the transmitter strap batteries may be low.

Make sure you breathe smoothly and regularly.

Talking during your workout usually causes heart rate spikes of five beats per minute or more, so avoid talking as much as possible.

Maintain a smooth pedaling motion.

Two users wearing the same kind of transmitter at the same time and in close proximity may cause false heart rate display readings.

**IMPORTANT
POINTS
ABOUT
HEART RATE
CONTROL**



CHAPTER EIGHT

CALORIE GOAL WORKOUT

IN THIS CHAPTER:

CALORIE GOAL WORKOUT

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Calorie Goal lets you pick a total number of calories and workout time, then calculates a steady-state exercise at a work level (*Cruising Watts*) so that you reach your target total calories at the end of a 2.5-minute cooldown. There is a 2.5-minute warmup prior to *Cruising Watts*.

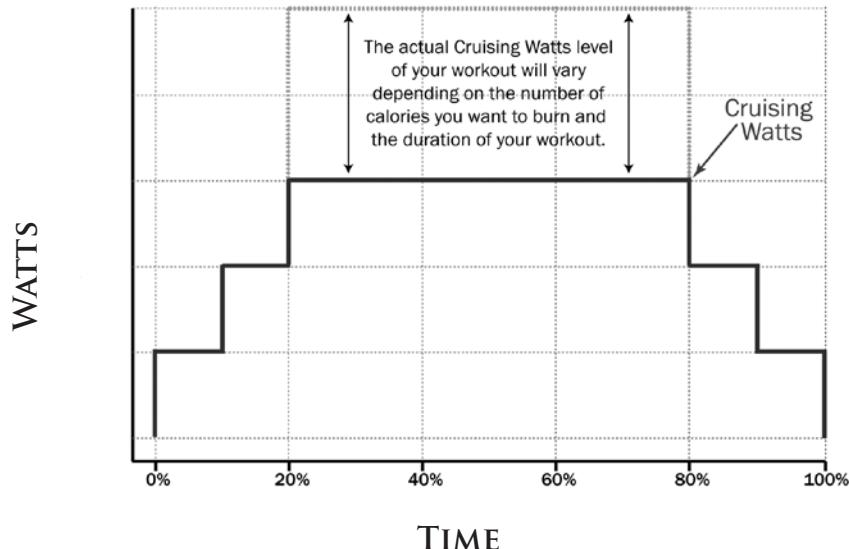
SETTING UP A CALORIE GOAL WORKOUT

Calorie Goal is especially useful if you exercise to help with weight loss or weight control. You might have a specific number of calories you wish to burn in each exercise session. Also, you sometimes have different amounts of time available to exercise. Calorie goal is the easiest way to achieve your exercise goal, no matter what your schedule.

To change your calorie goal, press the   keys to change one calorie at a time, or enter a new calorie goal with the numeric keys and press .

Some guidelines: Your workout time must be at least six minutes. If *Cruising Watts* are 400 or more, a warning will be displayed. The program will not accept a workout setup if *Cruising Watts* are above 600.

See the graphic on the next page for a visual explanation of a Calorie Goal workout.



CALORIE GOAL WORKOUT GRAPH



CHAPTER NINE

DESIGNING YOUR OWN WORKOUT

IN THIS CHAPTER:

CREATING YOUR OWN WORKOUT

CUSTOM WORKOUTS

CUSTOM INTERVALS

Chapter 1: Introduction
Chapter 2: Riding Your Bike
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There are two basic ways to create your own custom workout: have the CS8.0 bike record your level settings during a manual workout, or enter the workout levels directly with the keypad. The maximum number of segments in each custom program is 60. You can store three different custom programs. Segment intensity is recorded with Personal Power, so that your custom program can be properly used by others (see *Chapter 5*).

In *Record* mode, 60 changes in workload are recorded during your workout.

For direct entry of a workout program using the keypad, you can set as few or as many of the parameters as you wish. The default (called *Scale*) is for you to pick the total workout time, then enter up to 60 equal length segments. Each segment can have up to 77 different intensities, depending on body weight.

If you want to directly control the length of each segment, use *Fixed*.

If you select *Repeat*, you set a workout time, and the segment pattern you enter repeats over and over until the workout time is reached.

When you select a stored custom workout program as your workout, you can change the suggested workout time. This will simply stretch or shrink the program to fit the new workout time.

As you use a custom program, if you use the   keys, the workload intensity for the current segment only is shifted.

To program an interval workout, see Custom Intervals (below).

CREATING YOUR OWN WORKOUT

- Press Advanced Options until Custom Program 1, 2, or 3 is displayed.
- Use the   keys to select the type of custom program: scale, fixed, record, or repeat. Press .
- Enter your personal information.
- Enter your desired workout time. (*This step does not apply to the Fixed Custom Program. See Below.*)
- Use the   or numeric keys to adjust each parameter. Remember, you can use the  and  keys, too. Press  to accept each parameter. When you are entering the final parameter or workout segment in a custom program, press **AND HOLD** the  key to accept the last parameter and save the program. (*This step does not apply to the Record Custom Program. See Below.*)
- To completely delete a custom program: while in Edit mode, press , then press **AND HOLD**  again.

CUSTOM
PROGRAMS
STEP-BY-STEP

Type	Workout Time	Number of Segments	Segment Time	What to do and what happens
Scale	<i>Set by user</i>	<i>Auto</i>	<i>Auto/Scale</i>	<i>Set workout time, then enter up to 60 segments; auto-scales to workout time.</i>
Fixed	<i>Auto</i>	<i>Auto</i>	<i>Set by User</i>	<i>Set segment time, then enter up to 60 segments; workout time is the segment time multiplied by the number of segments</i>
Record	<i>Record</i>	<i>60</i>	<i>Auto</i>	<i>Begin to work out in default Manual mode</i>
Repeat	<i>Set by user</i>	<i>Auto/Repeat</i>	<i>Set by User</i>	<i>Set workout and segment time, then enter up to 10 segments; pattern repeats</i>

Scale: simply enter the work level for any number of segments between 1 and 60. The progress display shows you how it is scaling each segment to span the entire workout time.

CUSTOM WORKOUTS IN DEPTH

Fixed: for each segment, enter the segment length (between 5 and 90 seconds) and segment workload, up to 60 segments. The workout time will accumulate each segment time after you enter it. You cannot save a program until you have entered enough segments to add up to the minimum program time of five minutes.

Record: enter your desired workout time and starting workload. Press  when you are ready to record; you do not need to press and hold the  key. A custom Record program is only saved if the entire workout time is completed.

Repeat: for each segment, and a maximum of 10 segments, enter the segment length (between 5 and 99 seconds) and segment workload. When you finish by pressing and holding , the segments pattern will be repeated and appended until the workout time is reached.

Editing a program after it is saved: simply go to the program you wish to change and start changing any of the parameters or segments. As usual, press and hold  to save the program.

Since interval training is a common type of workout, the CS8.0 console has an extra-easy way to enter a custom interval program. After selecting Custom Intervals with the intervals button , pick the work segment and rest segment durations, then pick the work and rest segment exercise levels.

When you use the program, the segments repeat over and over until you reach the end of your workout time. Or you can have the program last for a certain number of work intervals.

CUSTOM INTERVALS



CHAPTER TEN

FITNESS TEST

IN THIS CHAPTER:

TEST INTRODUCTION

PROPER PREPARATION AND BEHAVIOR

HOW THE TEST WORKS

HOW TO USE YOUR RESULTS

TEST SPECIFIC ISSUES

Chapter 1: Introduction
Chapter 2: Riding Your Bike
Chapter 3: The Display
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The CS8.0 bike fitness test is an improved implementation of the YMCA protocol fitness test, as described in the *ACSM Guidelines*, Chapter 4. (See *Bibliography*.) The bike must monitor your heart rate accurately throughout, so you should use a wireless transmitter strap instead of the contact heart rate pads (see *Chapter 2*). It works best with the external power option.

The result of the test is an estimate of your maximal oxygen uptake, or $\text{VO}_{2\text{max}}$ (see *Appendix B*).

INTRODUCTION

- Press Advanced Options  until Fitness Test appears, then press .
- Fill out all the personal parameters. You **must** enter your age correctly.
- Press .

INSTRUCTIONS

Make sure the bike is displaying your heart rate, then pedal in a smooth and relaxed manner for the 12 minutes of gradually increasing workload. Your $\text{VO}_{2\text{max}}$ estimate will be displayed when you finish.

You should:

- Stay as relaxed as possible during the test, breathing smoothly and regularly.
- Be dressed in comfortable workout clothes and riding in a room with comfortable air temperature and humidity.

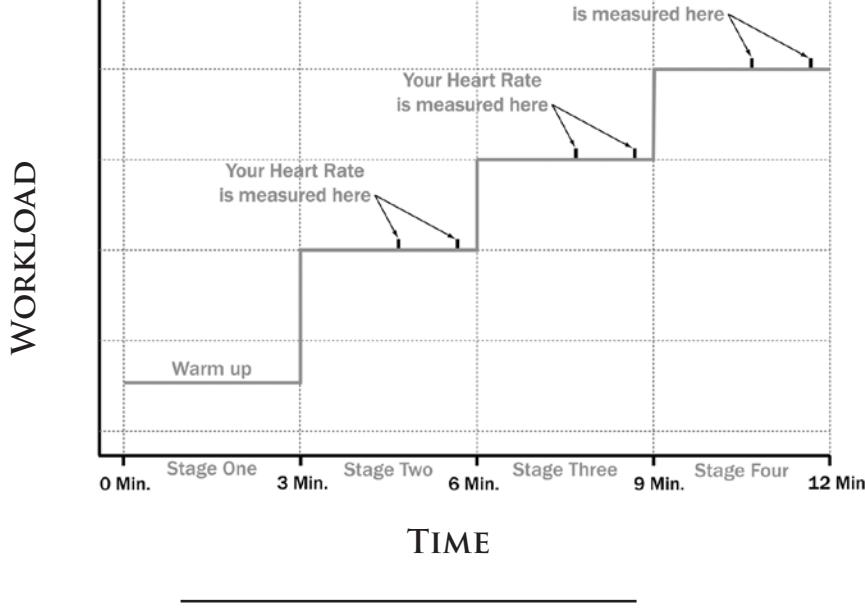
You should not:

- Eat within three hours prior to testing, but you should not be hungry, either.
- Consume caffeine within three hours prior.
- Smoke within three hours prior.
- Exercise vigorously within 24 hours prior.
- Make any unnecessary movements of arms, head, or torso.
- Talk at all.

The test consists of four three-minute stages. Stage one is a warmup stage. Stages two, three, and four are at ever-increasing workloads, with your heart rate measured during the second and third minute of each stage. (If the two heart rate samples in a given stage are separated by more than six bpm, that stage is extended for an additional minute.)

The heart rate measured during the last minute of each stage is compared mathematically with workload, and then extrapolated to your age-predicted maximal heart rate (see *Appendix A*). The workload corresponding to this heart rate is converted to milliliters of oxygen per kilogram of body weight per minute.

HOW THE TEST WORKS



The best way to use the results of a fitness test is to track your progress in an exercise program. Test yourself about every two weeks, under closely similar conditions.

HOW TO
USE YOUR
RESULTS

You can also use the results of a fitness test to find how you compare with an average population. Find your score in the chart below in the proper column for your age group. (Data is from *ACSM Guidelines*, from 1994 research from the Institute for Aerobics Research in Dallas, Texas.)

PERCENTILE VALUES FOR VO₂ MAX

Percentile	Age				
	20-29	30-39	40-49	50-59	60+
Men					
90	51.4	50.4	48.2	45.3	42.5
80	48.2	46.8	44.1	41.0	38.1
70	46.8	44.6	41.8	38.5	35.3
60	44.2	42.4	39.9	36.7	33.6
50	42.5	41.0	38.1	35.2	31.8
40	41.0	38.9	36.7	33.8	30.2
30	39.5	37.4	35.1	32.3	28.7
20	37.1	35.4	33.0	30.2	26.5
10	34.5	32.5	30.9	28.0	23.1
Women					
90	44.2	41.0	39.5	35.2	35.2
80	41.0	38.6	36.3	32.3	31.2
70	38.1	36.7	33.8	30.9	20.4
60	36.7	34.6	32.3	29.4	27.2
50	35.2	33.8	30.9	28.2	25.8
40	33.8	32.3	29.5	26.9	24.5
30	32.3	30.5	28.3	25.5	23.8
20	30.6	28.7	26.5	24.3	22.8
10	28.4	26.5	25.1	22.3	20.8



TEST SPECIFIC ISSUES

CHAPTER TEN: FITNESS TEST

Note that the absolute accuracy of this test is approximately +/- 15% compared to a laboratory maximal test. (See Swain and Leutholtz, *Metabolic Calculations*, page 63). The results on the CS8.0 bike should be somewhat better since it uses an improved maximum heart rate formula (see *Appendix A*).

The repeatability accuracy, from test to test with the same test subject, should be much better, probably within +/- 7%.

Personal Power is used to calculate work levels that are more appropriate than in the standard YMCA protocol.

MEDICAL AND ERGOMETER MODE

IN THIS CHAPTER:

WHAT THESE MODES DO

HOW THESE MODES ARE DIFFERENT

Chapter 1: Introduction
Chapter 2: Riding Your Bike
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These modes require the use of the external power option, and are accessed by changing the default operation mode in Setup Mode (see *Chapter 14*). They differ from normal operation in several ways.

These modes:

- Restrict operation to just manual and custom programs.
- Replace the normal workload control modes to modes more common in the rehabilitation and testing environments.
- Provide a unique rpm limiting feature for cases where excessively rapid motion is of concern.
- Work in constant power mode and, since precise workload control is of prime importance all the time, torque is not rolled off at low rpms (see *Appendix C*).
- Have lower than normal minimum workload, because of the use of external power.

The two modes differ in the way they control workload:

Ergometer Mode: This emulates a popular cycle ergometer whose workload settings are in kiloponds (see side bar) and are adjusted by changing the amount of weight (in kilograms) at the end of a brake belt wrapped around a flywheel.

Many testing protocols are written especially for such an ergometer. These protocols can now be run on the CS8.0 bike, either programmed into a custom program or run manually.

Medical Mode: This uses either METs or watts, instead of kiloponds, for workload control. (Although that's just like normal operation mode, Medical mode adds the previously mentioned useful functions like no torque roll-off and rpm limiting, and doesn't allow riders to play around with other exercise modes.) Most exercise prescriptions are in either METs or watts, so this mode is useful for that.

These modes restrict operation to manual and custom programs. Refer to Chapter 5 for manual operation and Chapter 9 for custom program operation.

Change the pedal RPM limit in Setup Mode.

HOW THESE MODES ARE DIFFERENT

What's a kilopond?
This is an obsolete unit of force, equivalent to the gravitational force on one kilogram at the earth's surface, or about 9.8 newtons. Sweden made the kilopond its official unit of force in 1945, and thus it ended up being used in an ergometer made in Sweden. It is essentially equivalent to the force on a kilogram at the Earth's surface.

OPERATIONS RESTRICTIONS

SETTING PEDAL RPM LIMIT



CHAPTER TWELVE

OTHER FUNCTIONS

IN THIS CHAPTER:

OTHER FUN STUFF

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Happy Workout: This allows riders to perform a virtual (i.e., imaginary) world-class workout. The bike thinks the rider is generating six times as much power as he really is, and all the related workout data like speed and calories are accelerated as a result. One use of Happy Workout is to allow easier demonstration of the bike to serious riders.

Enable Happy Workout under the Advanced Options key after enabling it in Setup Mode.

**HAPPY
WORKOUT
AND
ELECTRONIC
IN/OUT**

Electronic Input and Output: The CS8.0 console provides two communication ports, labeled “Comm” and “Aux.” They use the CSAFE standard, typically to provide power to and communicate with a channel- and volume-control device for a sports club entertainment system such as BroadcastVision® or Cardio Theater®. The Audio Remote keys generate these control signals.

The Comm port also supports the full CSAFE Level 3 communications specification for use with fitness equipment networks (see fitlinxx.com/csafe/specification.htm)

The Video In port is not currently used.



CHAPTER THIRTEEN

CREATING AN EXERCISE PLAN

IN THIS CHAPTER:

THE F.I.T. CONCEPT DEFINED

UTILIZING THE F.I.T. CONCEPT

BEGINNING YOUR F.I.T. PROGRAM

ESTABLISHING AND MAINTAINING FITNESS

WEIGHT MANAGEMENT

SPORTS TRAINING

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The workout portion of your exercise program consists of three major variables: Frequency, Intensity, and Time.

WHAT IS THE F.I.T. CONCEPT?

Frequency: How Often You Exercise

You should exercise three to five times a week to improve your cardiovascular and muscle fitness. Improvements are significantly smaller with less frequent exercise.

Intensity: How Hard You Exercise

Intensity of exercise is reflected in your heart rate. Exercise must be sufficiently rigorous to strengthen your heart muscle and condition your cardiovascular system. Only your doctor can prescribe the target training heart range appropriate for your particular needs and physical condition.

Start with exercise that stimulates you to breathe more deeply.

Alternate days of moderate and easy exercise to help your body adapt to new levels of exertion without unnecessary strain.

If you are just beginning an exercise program, you may be most comfortable using your bike at low workloads. As you use your bike regularly, higher workloads may be more comfortable and more effective.

If you feel out of breath before you have exercised 12 minutes, you are probably exercising too hard.

As your fitness level improves, you will need to increase your workout intensity in order to reach your target heart rate. The first increase may be necessary after two to four weeks of regular exercise. Never exceed your target heart rate zone. Increase the workload on the bike to raise your heart rate to the level recommended by your doctor.

METs

One MET is the amount of energy your body uses when you're resting. If a physical activity has an equivalent of 6 METs, its energy demands are six times that of your resting state. The MET is a useful measurement because it accounts for differences in body weight. See *Appendix C* for more details.

Time: How Long You Exercise

Sustained exercise conditions your heart, lungs, and muscles. The longer you are able to sustain exercise within your target heart range, the greater the aerobic benefits.

To begin, maintain two to three minutes of steady, rhythmic exercise and then check your heart rate.

The initial goal for aerobic training is 12 continuous minutes.

Increase your workout time approximately one or two minutes per week until you are able to maintain 20-30 continuous minutes at your training heart rate.

The F.I.T. concept is designed to help you begin a program tailored to your needs. You may wish to keep an exercise log to monitor your progress.

USING THE F.I.T. CONCEPT

You can get valuable fitness benefits from your CS 8.0 Bike. Using the bike regularly may increase the ability of your heart and lungs to supply oxygen and nutrients to exercising muscles over an extended period of time. The bike will also help you develop added muscle endurance and balanced strength throughout your body.

YOUR FITNESS PROGRAM

Calculate your maximum heart rate as a first step in developing your fitness program. The formula to calculate average maximum heart rate for one minute is:

$$205.8 - (0.685 * \text{age})$$

See *Appendix A* for the source of this formula.

To find your pulse, locate a vein on your neck or inside your wrist, then count beats for 10 seconds, then multiply by six.

DETERMINING YOUR NEEDS

It's also important to know your target training zone or target heart rate. The American College of Sports Medicine (ACSM) suggests 55% to 65% for lower-conditioned users, 75% to 80% for moderately conditioned users, and up to 90% for well-conditioned users. (See *Appendix D*.)

In addition to monitoring your heart rate as you exercise, be certain of how quickly your heart rate recovers. If your heart rate is over 120 beats per minute five minutes after exercising, or is higher than normal the morning after exercising, your exertion may be too strenuous for your current level of fitness. Reducing the intensity of your workout is recommended.

The age-adjusted target heart rates indicated in *Appendix A* reflect averages. A variety of factors (including medication, emotional state, temperature, and other conditions) can affect the exercise heart rate appropriate for you.

Warning: Consult your doctor to establish the exercise intensity (target heart rate zone) appropriate for your age and condition before beginning any exercise program.

BEGINNING YOUR EXERCISE PROGRAM

Warm-Up: Slow and Deliberate Exercise

You are not warmed up until you begin to perspire lightly and breathe more deeply. Warming up prepares your heart and other muscles for more intense exercise and helps you avoid premature exhaustion. Start slowly, exploring different workloads until you can comfortably sustain your exercise level. A good suggestion is a minimum of three minutes. Perspiration on your brow is a good indicator of a thorough warm-up. The older you are, the longer your warm-up period should be.

Workout: Brisk and Rhythmic Exercise

The workout trains and conditions your heart, lungs, and muscles to operate more efficiently. Increase exercise in response to your heart rate to train and strengthen your cardiovascular system. Concentrate on exercising smoothly.

Cool-Down: Slow and Relaxed Exercise

Cooling down relaxes your muscles and gradually lowers your heart rate. Slowly reduce your workload until your heart rate is below 60 percent of your maximum heart rate. The cool down should last at least five minutes, followed by some light stretching to enhance your flexibility.

Beginning a Fitness Program

If you cannot sustain 12 continuous minutes in your target heart rate zone, exercise several times a day to get into the habit of exercising.

Try to reach and maintain 60-65 percent of your maximum heart rate. Alternate exercise with periods of rest until you can sustain 12 continuous minutes of exercise at 60-65 percent of your maximum heart rate.

Begin exercising in three to five minute sessions.

If you can sustain 12 but not 20 continuous minutes of exercise in your target heart rate zone:

Exercise three to five days a week.

Rest at least two days per week.

Try to reach and maintain 60-75 percent of your maximum heart rate with moderate rhythmic exercise.

Begin with 12 continuous minutes. Increase your time by one to two minutes per week until you can sustain 20 continuous minutes.

ESTABLISHING AEROBIC FITNESS

If you can sustain 20 continuous minutes in your target heart rate zone, begin to increase the length and intensity of your workout:

Exercise four to six days a week or on alternate days.

Try to reach and maintain 70-85 percent of your maximum heart rate with moderate to somewhat hard exercise.

Exercise for 20-30 minutes.

MAINTAINING AEROBIC FITNESS

Consistent aerobic exercise will help you change your body composition by lowering your percentage of body fat. If weight loss is a goal, combine an increase in the length of your workouts with a moderate decrease in caloric intake. For weight control, how long and how often you exercise is more important than how hard you exercise.

- Exercise four to five times a week.
- Try to reach and maintain 60-75 percent of your maximum heart rate with moderate exercise.
- Exercise for 30-45 minutes at 60-65 percent of your target heart rate.

Here are some tips to achieving your weight management goal:

- Consume most of your dietary calories at breakfast and lunch, and eat a light dinner. Do not eat close to bedtime.
- Exercise before meals. Moderate exercise will help suppress your appetite.
- Take exercise breaks throughout the day to help increase metabolism (calorie expenditure).

MANAGING WEIGHT

When you are training to improve strength and performance:

- Exercise four to five days a week. Alternate exercise days and intervals of hard to very hard exercise with easy to moderate exercise.
- Exercise for 30 minutes or longer.

SPORTS TRAINING

Warning: these strategies are intended for average healthy adults. If you have pain or tightness in your chest, an irregular heartbeat, shortness of breath or if you feel faint or have any discomfort when you exercise, **Stop!** Consult your physician before continuing. Remember, every workout should begin with a warm-up and finish with a cool-down.



CHAPTER FOURTEEN

SETUP MODE

IN THIS CHAPTER:

GETTING INTO SETUP MODE
CUSTOMIZABLE OPTIONS
ODOMETERS

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Press and hold .

Begin pedaling the bike, or power up with external power.

At the five-digit “Pass Code” prompt, enter 1 0 1 0 1 . If you make a mistake, start entering the code from the beginning.

Press .

The first Setup Mode screen will be displayed. Pressing  will switch to the second screen.

Press  to accept each parameter and move to the next one.

When you’re done making changes, let the bike power all the way down (the orbiting LEDs on the front overlay will go out). The changes will take effect the next time the bike powers up.

HOW TO GET INTO SETUP MODE

Language: Currently, only English is supported.

CUSTOMIZABLE OPTIONS

Units: English (default) or metric.

Maximum Workout Time: From 1 to 98 minutes, and unlimited. Thirty minutes is the default.

Default Time: This is the workout time Workout Setup first suggests. From 1 to 98 minutes, never greater than maximum time. Twenty minutes is the default.

Pause Time: Fifteen seconds (default), 30, 60, and 120 seconds and unlimited. Pauses longer than 15 seconds are available only with external power.

Pulse Priority: If the CS8.0 bike sees both transmitter belt and contact heart rate signals, this setting determines which one it will pay attention to. The default is wireless priority.

Ops Mode:

- Normal (default), where you can access most of the features.
- Medical or Ergometer, the two special modes for rehab or testing.

RPM Limit: If Medical or Ergometer mode is selected, RPM will be limited by a significant workload increase.



MORE CUSTOM OPTIONS

CHAPTER FOURTEEN: SETUP MODE

Default manual: Personal Power-based, or Bicycle Simulation, or Constant Power with 10-watt increments.

Sound: Tones are on (default) or off.

Happy: Adds Happy Mode under Advanced Options key.

CSAFE Enable: Turns on CSAFE network communications.

CSAFE Auto: Bike will auto-announce itself to the network when it powers up.

Def. Weight: Suggested body weight.

Display Options: The number of different data readout sets. Setting a value of “3” will allow two normal screens and the ECG waveform display. Setting a value of “5” will allow two additional screens with more advanced readouts like watts and running speed equivalents.

Reset: Restore factory default settings.

Miles: Accumulated “miles,” which is simulated road bike miles. Even though this is just a simulated number, it actually is a good measure of stress and wear on the bike mechanism and braking system. Higher mileage results from higher braking power, more pedal revolutions, or both.

ODOMETERS

Hours: Total hours the bike has been in use. If the bike is idle or in attract mode, hours do not accumulate; in general, the pedals have to be moving for hours to accumulate.

Total Starts: The total number of times the bike awakens from either sleep mode or attract mode.

Program Selection Counters: For each different workout, how many times a new workout was initiated.



CHAPTER FIFTEEN

CARE AND MAINTENANCE

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Chapter 15: Care and Maintenance

Your CS8.0 bike doesn't require any routine maintenance, not even lubrication. Keeping it clean is the most important task.

After every workout: Perspiration should be wiped from the control console, contact heart rate pads, shrouds, and seat.



Weekly: Wipe down your CS8.0 bike once a week with a water-dampened soft cloth. On the contact heart rate pads, use a glass cleaning solution. Be careful not to get excessive moisture between the edge of the overlay panel and the console, as this might create an electrical hazard or cause the electronics to fail.



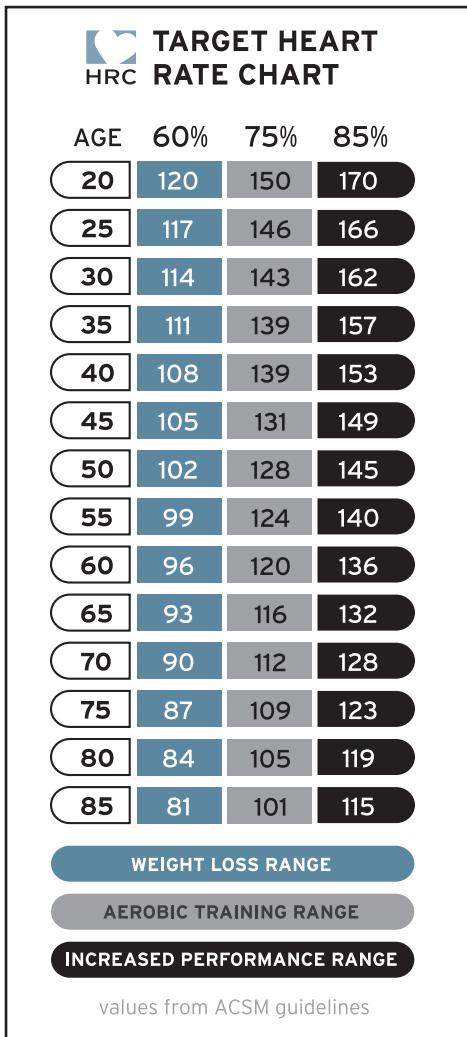
Expert service and maintenance at a reasonable cost are available through your factory-trained, authorized TRUE Fitness dealer. The dealer maintains a stock of repair and replacement parts and has the technical knowledge to meet your service needs.



APPENDIX A

APPENDIX A

MAXIMUM HEART RATE AND TARGET HEART RATE

TARGET
HEART RATE
CHART

Remember to check with your physician before beginning any exercise program. Your physician can help determine an appropriate target heart rate. Medications often affect heart

CHECK
WITH YOUR
PHYSICIAN

Remember to check with your physician before beginning any exercise program. He/She can help determine an appropriate target heart rate. Medications often affect heart rate.

**CHECK
WITH YOUR
PHYSICIAN**

Robert Robergs, editor of the prestigious *Journal of Exercise Physiology*, conducted a study in 2002 of the maximal heart rate equation 220 - age. He found this equation "has no scientific merit for use in exercise physiology and related fields."

**A NEW
HRMAX
EQUATION**

In his survey of research in this area, Robergs found several other simple equations that were significantly more accurate. The best equation he found was derived in 1994 by Oten Inbar:

$$205.8 - (0.685 * \text{age})$$

The CS 8.0 console uses the Inbar equation. Even though this is the best available equation, it still has a possible range of error of +/- 6 beats per minute.

Other similar equations that are also more accurate than 220 - age are:

$$206.3 - (0.711 * \text{age}) \text{ (Londeree, 1982)}$$

$$206.0 - (0.700 * \text{age}) \text{ (Tanaka, 2001)}$$

$$208.8 - (0.734 * \text{age}) \text{ (Robergs meta study, 2002)}$$

Roberg's paper can be found here:
<http://www.asep.org/Documents/Robergs2.pdf>



APPENDIX B

APPENDIX B

MAXIMAL OXYGEN UPTAKE AND METS

Maximal oxygen uptake, or VO_2max , is considered the best single measurement of cardiovascular fitness. It represents the peak rate of your body's oxygen consumption capability, which is important because this is one of the two biggest factors in endurance performance.

VO_2

(The other big endurance factor is the *lactate threshold*, which is the exercise level at which blood lactate begins to accumulate above resting levels. The lactate threshold is much more difficult to measure than VO_2max , which is why VO_2max is the accepted standard.)

The only accurate way to measure VO_2max is to use a laboratory-grade respiratory diagnostic system during a maximal exercise test. All other methods produce an estimate with varying degrees of accuracy.

Serious training results in an average improvement in VO_2max of 20%, and all this takes place in 8 to 12 weeks. Additional performance improvement after this time is a result of a higher lactate threshold and, to a lesser degree, increased biomechanical efficiency.

(See Wilmore & Costill, *Physiology of Sport and Exercise*, pages 140-141, and ACSM Guidelines, page 68).

VO_2max is expressed in milliters of oxygen per minute per kilogram of body weight, or ml/min/kg.



APPENDIX B

METs are defined as the ratio of the current body energy expenditure rate compared with basal metabolic rate (BMR):

$$\text{METs} = (\text{VO}_2 \text{ rate of current state}) / 3.5$$

where 3.5 represents BMR. VO_2 (oxygen uptake) and 3.5 are in units of ml/kg/minute of oxygen consumed by the body. This oxygen consumption rate corresponds to about 72 calories per hour for a 150-pound person.

MET EXPLANATION



APPENDIX C

APPENDIX C

DETAILS ON HOW THE CS8.0 BIKE
CONTROLS YOUR EXERCISE INTENSITY

As you ride the CS8.0 bike, your exercise intensity is best measured as the amount of power received by the bike from your pedaling. This power is usually expressed in watts. The watts measurement is calculated from your pedaling speed (called *cadence*) multiplied by the amount of resistance on the pedals (called torque). (See Feynman, *Lectures on Physics*, 1971.)

CONSTANT POWER & CONSTANT TORQUE

In most cases it is desirable to keep the exercise intensity constant, no matter what the pedal cadence, since it allows accurate control of the rider's workout. This kind of workload control is called *constant power*. If you pedal faster, the resistance on the pedals (torque) is reduced by the same amount. If you pedal slower, the resistance is increased.

If, instead, the amount of resistance on the pedals stays the same when your cadence changes, your workload intensity will vary directly with your cadence. If you pedal twice as fast, your exercise intensity doubles. This kind of workload control is called *constant torque*.

Constant power is used by the CS8.0 bike in most cases, in order to provide the most accurate workload control. This is especially important in heart rate control workouts and the Calorie Goal program.

A negative side-effect of constant power is that at very low cadences, such as below 55 rpm, the amount of extra torque applied to the pedals to keep power constant is so great that the rider may not be able to keep the pedals moving. To reduce this problem, the bike changes to constant torque at cadences below 55 rpm, preventing any further increases in torque. The computer will also warn you that it is no longer able to control exercise intensity.

Constant torque is used in a modified way in Bike Mode. In addition to constant resistance for a given “gear,” additional torque is applied to simulate wind and road resistance, as well as to compensate for different body weights.

THE PERSONAL POWER CALCULATION

Personal Power was initially designed to vary workload at a 1:1 ratio with body weight, just like a METs-based exercise prescription. However, it turns out that human endurance and power generating capability varies with the 2/3 root of body weight, not straight body weight. This relationship can be seen in everything from weightlifting world records to distance running competitions. (See McMahon and Bonner, *On Size and Life* (1985), page 55).

Since METs do not work the way they’re supposed to, Personal Power is based on a new unit of measure that correctly accounts for body weight. This new unit of metabolic measure, called the T-MET, is defined as:

$$\text{T-MET} = \text{watts} / (\text{kg})^{2/3}$$

where watts is power applied to an external machine from the exerciser, and kg is the exerciser’s body weight in kilograms.



APPENDIX D

AMERICAN COLLEGE OF SPORTS MEDICINE POSITION STAND ON EXERCISE AND FITNESS

In 1998, the American College of Sports Medicine completed their most important position stand, titled, “The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults.” The ACSM is recognized as the premier authority in this area, so this document describes the current consensus among exercise physiologists and coaches.

INTRODUCTION

(Also note that the ACSM is a fairly conservative body, so they only make recommendations when there are compelling reasons.)

The following is a summary of the document. The full document can be found on the ACSM’s journal’s website:

<<http://ipsapp006.lwwonline.com/content/getfile/2320/20/1050/fulltext.htm>>

The variables of frequency, intensity, and duration of exercise quantify the degree of overload stimulus in an exercise program. In general, the greater the stimulus the greater the training effect. All three types of exercise (cardiovascular, resistance, and flexibility) should be included in a training program.

Cardiovascular training is especially sensitive to frequency and intensity; the minimums for developing and maintaining fitness are at least ten minutes per day at a minimum of 50% VO_{2max} at least two days per week. Proper warmup and cooldown, including flexibility, are recommended.

Training should be three to five days per week at between 55% and 90% maximum heart rate. Deconditioned individuals should stay between 55% and 64%. Total duration of training should be between 20 and 60 minutes, with the time varying inversely with intensity. High-intensity, short duration exercise is generally only recommended when training for non-athletic competition.

Adequate exercise intensity requires the use of large muscle groups, which typically means legs and buttocks. In some cases, shoulders and upper back muscles used in rigorous swimming will be adequate.

SPECIFIC ADVICE
FOR
CARDIO
FITNESS AND
BODY
COMPOSITION

Resistance training should consist of one set of 8 to 10 exercises that stimulate all the major muscle groups, two to three days a week. Multiple sets will not necessarily provide greater benefits, especially considering the significantly increased time requirements and adherence difficulties.

Flexibility exercises should stretch the major muscle groups a minimum of two to three times a week, and should include both static and dynamic techniques.

SPECIFIC ADVICE
FOR MUSCULAR
STRENGTH
AND FLEXIBILITY



APPENDIX E

APPENDIX E

SPECIFICATIONS



APPENDIX E

<u>Resistance</u>	Hybrid Self-Generating Brake
<u>Drive</u>	2 Stage Drive System with Poly-V Belts
<u>Crank</u>	One Piece Forged Steel Crank System With Sealed Bearings
<u>Power Source</u>	Self-Generating. Optional External Power Supply Available
<u>Frame</u>	Robotically Welded Heavy-Duty Tubular Steel
<u>Finish</u>	Powder Coat
<u>Seat - RECLINER</u>	Ergonomic Seat With 24 Custom Settings and Multiple Seat Back Angles
<u>Seat - UPRIGHT</u>	Ergonomic Seat With 15 Position Settings
<u>Handlebars - RECLINER</u>	Replaceable Rubber Sleeve on Balance Bar and Seat Handlebar
<u>Handlebars - UPRIGHT</u>	Sweat Resistant Overmolded Steel with Integrated Elbow Support Pads
<u>Pedals</u>	Integrated Adjustable Strap
<u>Display Type</u>	Dual Window Custom LCD
<u>Keys</u>	Membrane Switches
<u>Express Command Keys</u>	4 – Manual, Intervals, Hill Programs, HRC Cruise Control™
<u>Data Readouts</u>	Time, Distance, RPM, Heart Rate, Work Level, Watts, METs, Calories
<u>Message Center</u>	17 Character Alphanumeric
<u>Contact Heart Rate</u>	Digital – 4 Sensing Pads (UPRIGHT: 2 Sets)
<u>Telemetry Heart Rate</u>	Wireless – Polar® Equipped
<u>HRC Programs</u>	4 – Time Based, Interval, Ultra, Ultra Interval
<u>Preset</u>	7 – Manual, Quick Start, Easy Intervals, Speed Intervals, Custom Intervals, Rolling Hills, One Big Hill
<u>User Defined</u>	1 – Custom Intervals
<u>Fitness Tests</u>	1 – Improved YMCA Protocol
<u>Entertainment</u>	Seamless Integration with TRUE Entertainment Options
<u>Communications</u>	Full CSAE Compatibility
<u>Accessories</u>	Reading Rack, CD & Bottle Holder
<u>Safety</u>	Reinforced Steel Frame with Secure Footprint
<u>Footprint - RECLINER</u>	65" L x 25" W (166 cm x 64 cm)
<u>Footprint - UPRIGHT</u>	43" L x 25" W (109 cm x 64 cm)
<u>Weight / Shipping Weight - RECLINER</u>	194 lbs (88 kg) / 215 lbs (98 kg)
<u>Weight / Shipping Weight - UPRIGHT</u>	120 lbs (54 kg) / 140 lbs (64 kg)
<u>Maximum User Weight</u>	350 lbs (158 kg)
<u>Resistance Levels</u>	TRUESpeed™ Fine Control, Bike Simulation, Conventional 10 Watt Increments
<u>Resistance Range</u>	40-600 Watts
<u>Maximum Workout Time</u>	99 Minutes
<u>Regulatory Approvals</u>	UL, CSA, FCC, CE



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